

head and thorax densely covered with white hair, tinged with ochreous on vertex and scutellum; tegulæ clear testaceous; wings clear, stigma ferruginous; hind femora and tibiæ clear red, with much light fulvous hair; abdomen with very broad felt-like bands.

Deesa, India, March 1900 (*Nurse*).

In Feb. 1899 Col. Nurse collected a male at Deesa which may, I think, be referred here. It is, of course, smaller (length hardly 11 mm.) and more slender, but it has the same general appearance. The hind femora, however, are dark and their tibiæ are strongly infuscated except apically, while all the tarsi are ferruginous. The flagellum is dusky reddish beneath and the malar space is longer than broad. This male is very easily known from *C. hylæiformis*, Eversm., by the long malar space and the total lack of coarse punctures on the exposed parts of abdomen. The face and front are densely covered with pure white hair, and there is a fringe of very long hair about the ocelli. The hair of the metathorax is pure white, that of the scutellum very faintly yellowish.

Specimens of all the new forms described above will be found in the Nurse collection at the British Museum.

XXVII.—*Note on the Œsophageal Teeth of the Stromateidæ.*
By J. D. F. GILCHRIST, M.A., D.Sc.

IN this family of fishes certain structures, variously described as "teeth," "tooth-like processes," "long barbed teeth," "internal papillæ beset with setiform teeth," &c., are mentioned as occurring in the œsophagus. The presence of teeth, or structures homologous with teeth, is scarcely to be expected in this region of the alimentary tract, and is therefore of some interest. The fact also that these "teeth" are found in two large saccular outgrowths of the alimentary tract, just behind the branchial region, is suggestive of a pair of closed gill-slits, and is another point worthy of attention.

These toothed sacs do not seem to have been further investigated or compared in different types, and the examination of species of *Psenes*, *Stromateus*, and *Nomeus* show some noteworthy features and differences. In these, internal papillæ—or, rather, lobes—beset with setiform structures were found, and, in one species of *Psenes* and *Stromateus*, tooth-like processes with barbs. The last cases present some

striking features, and may be considered first. The species of *Psenes*, which was found in rather deep water off the coast of Natal, seems to be new, and may be provisionally called *P. natalensis* for convenience.

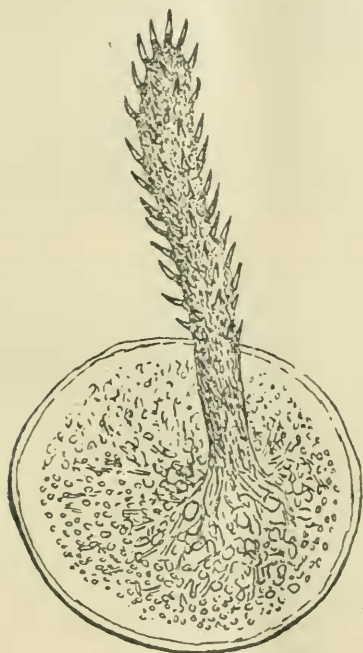
Psenes natalensis.

The œsophageal pouches are conspicuous structures lying in the anterior end of the cœlom, apparently on the œsophagus, just behind the pharyngeal region. In a mature specimen of 150 mm. they measure 16 mm. in length, or slightly larger than the diameter of the eye of the fish. They measure 7 mm. in vertical diameter. Unlike other cases, to be noted later, they lie parallel with the alimentary tract, and do not extend below the level of its lower margin. Externally the whole structure consists of a great thickening of the muscular layers of the splanchnopleure. Internally it is lined by the endoderm, which expands out on each side dorso-laterally to form the pouches in which the "teeth" are lodged. It is the nature of this endoderm and its tooth-like structures which is in question, but the relation of this whole structure to the branchial system may first be considered. It is in direct and intimate connection with the fifth branchial arch, the ceratobranchials of which are long and slender. They meet each other ventrally at a point, where they are supported at the end of the basal elements of the other arches. There is a small slit separating the fourth and fifth arch, and on the latter there are about seven reduced gill-rakers. They pass upwards on each side of the anterior end of the œsophageal sacs, which they thus support. They are continued dorsally, as small epibranchial elements, directed forwards to very large well-calcified pharyngo-branchials, which are fused together to form a stout concave structure, in which the mass is firmly secured. The teeth on these upper pharyngeals are well developed, and form rounded patches, which lie in the anterior end of the œsophageal sacs, but do not penetrate further back, nor assume a lobed projecting form, as they do in types noted below. Posterior to these teeth and in the sacs lie the œsophageal teeth.

The sacs have thick walls, in which two muscular layers may be distinguished—an outer transverse layer and an inner longitudinal layer. On removing these, a somewhat remarkable appearance is presented, the whole of the exposed surface being covered with a series of what appears to be overlapping scales, each measuring between 2 and 3 mm. in diameter. On removing one of these it was found that

attached to its centre was one of the tooth-like processes which line the interior of each sac, and it was at first supposed that the placoid nature of the teeth was thus evident. On further examination, however, no lines of growth were seen in the scale, it was unaffected by acid, and, on boiling in caustic potash, it was seen to be made up of a somewhat

Fig. 1.



One of the tooth-like processes of the œsophageal sacs of
Psenes natalensis.

reticulate fibrous sheet of clear horny-looking tissue. Towards the periphery this substance was homogeneous, and near the centre fibres could be seen passing upwards to form the long "tooth" (text-fig. 1). On its upper two-thirds there were short offshoots, each capped with a hollow, sharp, curved spine, the longest being about .33 mm. They thus differ

markedly from the pharyngeal teeth, which form a small part of the inner lining of the sac at its anterior end. They bear a close resemblance to the gill-rakers, which in this fish are well developed. One of these, which was cut and treated in the same way, showed the same structure. It was 2·89 mm. in length; the spines were not, however, slightly curved, as in the œsophageal teeth. The conclusion arrived at is that, in this case, some of the teeth of the œsophageal sacs are teeth of the upper pharyngeals, most of them, however, being homologous with gill-rakers probably arising as an extension backwards of the epithelium of the last gill-arch.

Stromateus capensis.

The œsophageal sacs in this species form an almost spherical mass, about 17 mm. in diameter in a fish 200 mm.

Fig. 2.



One of the tooth-like processes of the œsophageal sacs of *Stromateus capensis*. Magnification the same as Fig. 1.

in length, or one and a half times the diameter of the eye. It is nearer the branchial region than in the last case, and is

supported mainly by the epibranchial and pharyngo-branchials of the fourth gill-arch. The toothed upper pharyngeals are not rounded patches, but are in the form of two ridges which project backwards and end in pointed free extremities projecting into the opening of each sac. There are a few reduced anterior gill-rakers on the fifth branchial arch, and the opening of the œsophageal pouch is immediately behind the gill-arch, so that there is a more apparent transition between the gill-rakers and the œsophageal teeth, which might therefore be readily interpreted as the posterior gill-rakers of the fifth branchial arch. These teeth are apparently of the same nature as in the last case. There is a marked difference, however, in their basal expansion, for they are firmly fixed in the muscular wall of the pouch, not by a circular scale-like structure, but by a number of root-like processes, which are more or less curved at their pointed extremities (text-fig. 2).

Psenes (Atimostoma, Smith ; Cubiceps, Günther) capensis.

The œsophageal sacs of this species do not, as in *P. natalensis*, lie parallel with the œsophagus, but more or less across it, following the general contour of the branchial arches. They thus project below the level of the œsophagus. They are closer to the branchial arches, and are mainly supported by the fourth. The most noteworthy difference is the greater development of the toothed upper pharyngeals. These, in the first arch, are poorly developed, and have no teeth, those of the second have a small patch of teeth, those of the third are well developed, and those of the fourth extend backwards as large toothed lobes into the œsophagus, past the openings of the two œsophageal pouches. The pouches are provided with rounded toothed lobes or papillæ similar to the pharyngo-branchials of the fourth arch. The long horny processes resembling gill-rakers are entirely absent in this species, and the inner lining of the œsophageal sacs seems to be entirely derived from a backward extension of the tooth-bearing epithelium of the superior pharyngeals. This epithelium can readily be distinguished from the œsophageal epithelium, which in this and some other species of the Stromateidæ is characterized by longitudinal foldings. These extend forward on the floor of the œsophagus between the sacs, and pass over the lip of the sac but not into it.

Nomeus gronovii.

In this fish the œsophageal sacs follow still more closely

the general direction of the branchial arches. As in the last case, the toothed epithelium of the upper branchial elements projects backwards as a stout lobe into the œsophagus, between the opening of the sacs, and is followed by several series of smaller lobes which line the interior of the sac, as in *Psenes capensis*.

Material was not available for the further examination of this and other types, which would no doubt throw further light on the structure and homology of these sacs, which we may, however, reasonably conclude, from the above evidence, are not strictly œsophageal, but are derived from an extension backwards of pharyngeal epithelium in the form of two pouches. There seems to be at least two distinct types, in which the lining of the sacs is derived from the toothed epithelium of the pharyngo-branchials, and the other in which it is derived from the raker-bearing elements of the gill-arch. The distinction may also prove to be of systematic importance, in which case species resembling *Psenes capensis* would be generically separated from species resembling *P. natalensis* in respect of the nature of their œsophageal teeth.

The origin of the conspicuous paired saccular outgrowths lined by pharyngeal epithelium is of interest, as they may date from a time in the phylogeny of the Teleosts when the gill-slit behind the fifth branchial arch began to close up, and may now be all that remains of this gill-slit. Their development and further comparative study of their structure in various groups (they also occur in the Tetragonuridæ) might throw some light on this point. Certainly in *Nomeus* they bear a striking, if superficial, resemblance in position to a gill-slit.

The physiological significance of the œsophageal teeth which are found in these fishes is of interest, and has doubtless some connexion with the nature of their food. The teeth of the jaws are poorly developed, and in some there are gill-raker-like structures below the pseudobranchiæ. It is known that some feed on medusæ. *Nomeus*—the well-known Portuguese man-of-war fish—is said to find protection from its enemies by hiding under the poisonous tentacles of the Portuguese man-of-war *Physalia*, and perhaps securing the jackal's share of its food; but it may be suspected that its object there, among medusæ-producing gonophores as well as poisonous tentacles, is not such an innocent one. The nature of the food may again be associated with another peculiar feature, well developed in some. Pores are described as occurring on the surface of the body, and these, when traced

into the underlying tissue in a species of *Centrolophus* from deep water at the Cape, were found to lead into a network of wide dermal canals, extending over the body, and filled with a viscid oily substance. The Cape "butter-fish"—*Stromateus capensis*—is highly prized for its fine flavour, while the *Centrolophus* referred to produces some kind of sickness or gastric disturbance when eaten—facts which have been noted in other members of the Stromateidæ.

XXVIII.—*A short Description of the Genitalia of (Ancistrocephalus) polypteri, Leydig, 1853.* By A. J. HESSE, B.Sc.*

THE Cestode *Ancistrocephalus polypteri* parasitic in the intestine of *Polypterus bichir* was found by Dr. Leydig of Würzburg in 1853. He described the scolex, but, as his specimens were either not mature or were the anterior portions of the Cestode, he was unable to give an account of the genitalia. No further account has since appeared. This description is made from material obtained from Professor Leiper's collection. The material was rather limited and preserved in formalin solution. There were present two different kinds of worms. Two were Cyclophyllids, and the rest, consisting of a few pieces of sexually mature proglottides, a few knotted segments, and two heads with about 9 to 15 cm. of strobila, were used by me to give this description.

External Appearance.

The worms showed a dirty white colour in the preserving-fluid. As the worms were not complete, a definite length cannot be given.

The scolex was about 1 mm. long and .5 mm. broad. Superficially it was club-shaped, with an anterior blunt and rounded margin.

There was present a crown of hooks in the form of four radiating groups. These were situated on four well-marked ridges. Each group had six claw-like hooks connected by a web-like structure (fig. 1).

Between the ridges passed down four shallow grooves, which are probably sucking-grooves. These were not well developed at all.

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